

REPLACED BY  
PCT 34 AND PTO

WO 2004/037916

PCT/CA2003/001599

16

WE CLAIM:

1. A composition comprising a soft ethylene elastomer component and an effective amount of filler to impart improved scratch and mar resistance properties to the composition while not significantly decreasing the softness of the composition.
2. A composition comprising a soft ethylene elastomer component and an effective amount of filler and compatibilizer to impart improved scratch and mar resistance properties to the composition while not significantly decreasing the softness of the composition.
3. The composition of claims 1 or 2 wherein the filler comprises from about 1% to about 20%, preferably from about 2% to about 15%, more preferably from about 3% to about 12% and most preferably from about 4% to about 10% by weight of the total composition.
4. The composition of claim 3 wherein the filler is a platy filler.
5. The composition of claim 4 wherein the filler is selected from the group consisting of mica, talc or clay.
6. The composition of claim 3 wherein the filler is a hard, spherical or elongated filler.
7. The composition of claim 6 wherein the filler is activated alumina.
8. A composition comprising a soft ethylene elastomer component and an effective amount of mica and compatibilizer to impart improved scratch and mar resistance properties to the composition while not significantly decreasing the softness of the composition.

9. The composition of claim 8, wherein the mica comprises from about 1% to about 20%, preferably from about 2% to about 15%, more preferably from about 3% to about 12% and most preferably from about 4% to about 10% by weight of the total composition.

10. The composition of any one of claims 2, 8 or 9, wherein the compatibilizer comprises from about 0.1% to about 10%, preferably from about 0.25% to about 7% by weight of the composition.

11. The composition of any one of claims 1 to 10, wherein the soft ethylene elastomer component is a rheology-modified, low gel thermoplastic elastomer composition comprising at least one elastomeric EAO polymer or EAO polymer blend and at least one high melting polymer selected from polypropylene homopolymers and propylene/ethylene copolymers.

12. The composition of claim 11, wherein the elastomeric EAO polymer or EAO polymer blend comprises from about 50 to about 95% by weight of the soft ethylene elastomer component and the high melting polymer comprises from about 5 to about 50% by weight of the soft ethylene elastomer component.

13. The composition of claim 11 or 12, wherein the rheology modification is peroxide induced using a level of peroxide sufficient to provide the combination of characteristics, the peroxide being an organic peroxide selected from  $\alpha$ ,  $\alpha'$ -bis(t-butylperoxy)-diisopropylbenzene, dicymyl peroxide, 2,5-dimethyl-2,5-di-(t-butyl peroxy)hexane, di-t- butylperoxide, 2,5-di(t-amyl peroxy)-2,5-dimethylhexane, 2,5-di-(t-butylperoxy)- 2,5-diphenylhexane, bis(alpha-methylbenzyl)peroxide, benzoyl peroxide, t-butyl perbenzoate and bis(t-butylperoxy)-diisopropylbenzene.

14. The composition of claim 13 further comprising at least one suitable co-agent with the peroxide.

15. The composition of any one of claims 1 to 14, further comprising at least one additive selected from the group consisting of EAOs that have not been rheology modified, process oils, plasticizers, specialty additives and pigments.

16. The composition of claim 15, wherein the specialty additives comprise one or more additives selected from the group consisting of: flame retardants; antioxidants; surface tension modifiers; anti-block agents; lubricants; antimicrobial agents such as organometallics, isohtazolones, organosulfurs and mercaptans; antioxidants such as phenolics, secondary amines, phosphites and thioesters; antistatic agents such as quaternary ammonium compounds, amines, and ethoxylated, propoxylated or glycerol compounds; hydrolytic stabilizers; lubricants such as fatty acids, fatty alcohols, esters, fatty amides, metallic stearates, paraffinic and microcrystalline waxes, silicones and orthophosphoric acid esters; mold release agents such as fine-particle or powdered solids, soaps, waxes, silicones, polyglycols and complex esters such as trimethylol propane tristearate or pentaerythritol tetrastearate; pigments, dyes and colorants; plasticizers such as esters of dibasic acids (or their anhydrides) with monohydric alcohols such as o-phthalates, adipates and benzoates; heat stabilizers such as organotin mercaptides, an octyl ester of thioglycolic acid and a barium or cadmium carboxylate; ultraviolet light stabilizers such as a hindered amine, an o-hydroxy-phenylbenzotriazole, a 2-hydroxy,4-alkoxyenzophenone, a salicylate, a cyanoacrylate, a nickel chelate and a benzylidene malonate and oxalamide; and zeolites, molecular sieves and other known deodorizers.

17. The composition of claim 16 wherein the specialty additive is silicone.

18. The composition of claim 17 wherein the silicone is polydimethylsiloxane.

19. The composition of claim 18 wherein the silicone comprises from about 0.1 to about 2.5 %, preferably from about 0.2 to about 1.0%, most preferably from about 0.25 to about 0.6% of the composition.

20. A composition comprising a soft ethylene elastomer component and an effective amount of filler and silicone to impart improved scratch and mar resistance properties to the composition while not significantly decreasing the softness of the composition.

21. The composition of claim 20 wherein the filler comprises from about 1% to about 20%, preferably from about 2% to about 15%, more preferably from about 3% to about 12% and most preferably from about 4% to about 10% by weight of the total composition.

22. The composition of claim 21 wherein the filler is a platy filler.

23. The composition of claim 22 wherein the filler is selected from the group consisting of mica, talc or clay.

24. The composition of claim 21 wherein the filler is a hard, spherical or elongated filler.

25. The composition of claim 24 wherein the filler is activated alumina.

26. A composition comprising a soft ethylene elastomer component and an effective amount of mica and silicone to impart improved scratch and mar resistance properties to the composition while not significantly decreasing the softness of the composition.

27. The composition of claim 26, wherein the mica comprises from about 1% to about 20%, preferably from about 2% to about 15%, more preferably from about 3% to about 12% and most preferably from about 4% to about 10% by weight of the total composition.

28. The composition any of claims 20 to 27 wherein the silicone comprises from about 0.1 to about 2.5 %, preferably from about 0.2 to about 1.0%, most preferably from about 0.25 to about 0.6% of the composition.

29. The composition of claim 28 wherein the silicone is polydimethylsiloxane.

30. A composition comprising a soft ethylene elastomer component and an effective amount of filler, silicone, and compatibilizer to impart improved scratch and mar resistance properties to the composition while not significantly decreasing the softness of the composition.

31. The composition of claim 30 wherein the filler comprises from about 1% to about 20%, preferably from about 2% to about 15%, more preferably from about 3% to about 12% and most preferably from about 4% to about 10% by weight of the total composition.

32. The composition of claim 31 wherein the filler is a platy filler.

33. The composition of claim 32 wherein the filler is selected from the group consisting of mica, talc or clay.

34. The composition of claim 31 wherein the filler is a hard, spherical or elongated filler.

35. The composition of claim 34 wherein the filler is activated alumina.

36. A composition comprising a soft ethylene elastomer component and an effective amount of mica, compatibilizer and silicone to impart improved scratch and mar resistance properties to the composition while not significantly decreasing the softness of the composition.

37. The composition of claim 36 wherein the mica comprises from about 1% to about 20%, preferably from about 2% to about 15%, more preferably from about 3% to about 12% and most preferably from about 4% to about 10% by weight of the total composition.

38. The composition of any one of claims 30 to 37, wherein the compatibilizer comprises from about 0.1% to about 10%, preferably from about 0.25% to about 7% by weight of the composition.

39. The composition any one of claims 30 to 38 wherein the silicone comprises from about 0.1 to about 2.5 %, preferably from about 0.2 to about 1.0%, most preferably from about 0.25 to about 0.6% of the composition.

40. The composition of claim 39 wherein the silicone is polydimethylsiloxane.

41. The composition of any one of claims 20 to 39, wherein the soft ethylene elastomer component is a rheology-modified, substantially gel-free thermoplastic elastomer composition comprising at least one elastomeric EAO polymer or EAO polymer blend and at least one high melting polymer selected from polypropylene homopolymers and propylene/ethylene copolymers.

42. The composition of claim 41, wherein the elastomeric EAO polymer or EAO polymer blend comprises from about 50 to about 95% by weight of the soft ethylene elastomer component and the high melting polymer comprises from about 5 to about 50% by weight of the soft ethylene elastomer component..

43. The composition of claim 42, wherein the rheology modification is peroxide induced using a level of peroxide sufficient to provide the combination of characteristics, the peroxide being an organic peroxide selected from  $\alpha$ ,  $\alpha'$ -bis(t-butylperoxy)-diisopropylbenzene, dicymyl peroxide, 2,5-dimethyl-2,5-di-(t-butyl peroxy)hexane, di-t- butylperoxide, 2,5-di(t-amyl peroxy)-2,5-dimethylhexane, 2,5-

di-(t-butylperoxy)- 2,5-diphenylhexane, bis(alpha-methylbenzyl)peroxide, benzoyl peroxide, t-butyl perbenzoate and bis(t-butylperoxy)-diisopropylbenzene.

44. The composition of claim 43 further comprising at least one suitable co-agent with the peroxide.

45. A process for preparing the composition of any one of claims 2, 8, 30 and 36, comprising the steps of:

- a. preparing a masterbatch comprising filler, compatibilizer and base resin;
- b. mixing the masterbatch with a soft ethylene elastomer composition at a mixing temperature from about 180°C to about 220°C, preferably from about 190°C to about 210°C; and,
- c. pelleting the composition of step (b) at a second temperature below the mixing temperature.

46. The process of claim 45 wherein the compatibilizer is a functionalised polyolefin.

47. The process of claim 45 or 46 wherein the base resin is an ethylene elastomer.

48. The process of any one of claims 45 to 47, wherein the compatibilizer comprises from about 1 to about 20 %, preferably from about 5 to about 15% by weight of the masterbatch.

49. The process of any one of claims 45 to 48, wherein the filler comprises from about 10 to about 90%, preferably from about 30 to about 60% by weight of the masterbatch.

50. The process of claim 49 wherein the filler is a platy filler.

51. The composition of claim 50 wherein the filler is selected from the group consisting of mica, talc or clay.

52. The composition of claim 51 wherein the filler is mica.

53. The composition of claim 49 wherein the filler is a hard, spherical or elongated filler.

54. The composition of claim 53 wherein the filler is activated alumina.

55. The process of any of claims 45 to 54 further comprising the step of adding a silicone to the composition.

56. The process of claim 55 wherein the silicone comprises from about 0.1 to about 2.5 %, preferably from about 0.2 to about 1.0%, most preferably from about 0.25 to about 0.6% of the composition.

57. The process of claim 56 wherein the silicone is polydimethylsiloxane.

58. A process for preparing the composition of any one of claims 1 to 44 comprising the steps of:

- a. adding from about 1 to about 20%, preferably from about 2 to about 15%, more preferably from about 3 to about 12% and most preferably from about 4 to about 10% filler to a soft ethylene elastomer composition at a mixing temperature from about 180°C to about 220°C, preferably from about 190°C to about 210°C; and,
- b. pelleting the composition of step (a) at a second temperature below the mixing temperature.

59. The process of claim 58 wherein the soft ethylene elastomer composition comprises a compatibilizer.

60. The process of claim 59 wherein the compatibilizer is added to the soft ethylene elastomer composition in step (a) before or at the same time as the filler.

61. The process of claim 58 further comprising the step of adding a silicone to the composition.

62. The process of claim 61 wherein the silicone comprises from about 0.1 to about 2.5 %, preferably from about 0.2 to about 1.0%, most preferably from about 0.25 to about 0.6% of the composition.

63. The process of claim 62 wherein the silicone is polydimethylsiloxane.

64. An article of manufacture having at least one component thereof fabricated from the composition of any one of claims 1 to 44, the article of manufacture is selected from the group consisting of: automobile interior parts, automobile exterior parts, consumer goods with soft touch grips and consumer appliances with soft touch surfaces.

65. An injection molded article of manufacture having at least one component thereof fabricated from the composition of any one of claims 1 to 44 wherein the article of manufacture is used in airbag door or other automotive interior applications.

66. An article of manufacture having at least one component thereof fabricated from the composition of any one of claims 1 to 44 wherein the article of manufacture is used in automotive interior applications.